IMPLEMENT OF PROBLEM BASED LEARNING MODEL WITH POLYA STRATEGY TO IMPROVE MATHEMATIC PROBLEM SOLVING ABILITY OF STUDENTS IN JUNIOR HIGH SCHOOL

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By

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ABSTRACT

The goal of this research is to improve students' problem-solving abilities by applying a mathematical model of problem-based learning with Polya strategy in MTA Junior High School grade VIII-A Gemolong. This research is action research conducted collaboratively between mathematics teachers and researchers. Students of class VIII-A in MTA Junior High School as receiver subjects measures were 30 students and teachers of mathematics as a subject of action giver. The methods of data collection are observation, field notes, documentation, and testing. The technique of data analysis consists of: data analysis process, data presentation, and data verification (conclusion). Based on the research result, it can be concluded that the application of the Problem Based Learning model with Polya strategy can improve mathematical problem solving ability of student class VIII-A. It can be seen from the indicators, namely: (1) Understanding the problem, increased from 30% (9 students) to 96.67% (29 students), (2) Planning strategy, increased from 26.67% (8 students) to 76.67% (23 students), (3) Executing the plan, increased from 23.33% (7 students) to 76.67% (23 students), and (4) Checking the answer, increased from 0% (0 students) to 56.67% (17 students).

Keywords: *Problem Based Learning, Polya Strategy, Problem Solving Abilities*

INTRODUCTION

Problem-solving ability is essential for students to capital students in learning mathematics. According to Sanjaya Vienna (2010), problem solving can help students to develop new knowledge and responsibly in the learning they are doing. In addition, the problem-solving can also push yourself to do a good evaluation of the results and the process of learning.

The low mathematic achievement because lack of students' ability in mathematical problems solving. Daily issues raised in the study of mathematics will make the students better understand the relationship between mathematics to the real situation that is happening in the environment and more skilled in the completion of a problem with the capabilities already possessed.

Based on the results of observations conducted by researchers at the MTA Gemolong Junior High School class VIII A, there is a problem in the completion of the students do mathematics problems. The errors are on the consecutive of problem solving steps, including (1) 70% of students who have not been able to identify the elements that are known and asked the question, (2) 73.33% of students have not been able to plan the completion strategy, (3) 76, 67% of students have not been able to apply strategies to solve problems, and (4) 100% of students no one has to re-examine the answers given.

The cause of the low ability students' mathematical problem solving is a learning process in the classroom teaching and learning activities that are less precise, so that students have difficulty in resolving the issues that give in the study.

Based on the root cause of the problem can be filed using the alternative action learning model of Problem Based Learning (PBL) with Polya strategy. According to Donalds Woods (in M.Taufiq Amir, 2010: 13) mentions PBL is more than just an effective environment to learn specific knowledge. He can help learners build skills in solving problems throughout his life, teamwork, and communication. So we can conclude that the use of PBL models can enhance students' problem solving abilities.

In practice (KEMENDIKBUD, 2013), problem solving for PBL learning model divided into 5 phases: 1) Phase 1 the orientation of students to the problem, 2) Phase 2 organizing the students, 3) Phase 3 guiding investigations of individuals and groups, 4) Phase 4 developing and presenting the work, and 5) Phase 5 analyzing and evaluating the problem-solving process.

According to Polya (Yosepa, 2001 in Dwi Priyo Utomo, 2012) there are four steps in solving a problem there are: first, to understand the problem; second, make a plan to solve the problem; Third, try or execute the plan; and the fourth, look back results that have been obtained as a whole. With a blend of PBL models with Polya strategy is expected to further enhance students' mathematical problem solving ability.

This study refers to the formulation of the problem, is there an improvement in the ability of problems solving through the implementation of Problem Based Learning Model with Polya Strategy in MTA Gemolong Junior High School class VIII-A Even Semester in Year 2013/2014.

This generally goals of this research is to improve math problem solving abilities, while the particular goal is to improve the ability of mathematical problem solving was implement of Problem Based Learning Model with Polya Strategy in MTA Gemolong Junior High School class VIII-A Even Semester in Year 2013/2014. Improvement of mathematical problem solving abilities views of indicators, that are: 1) Understanding the problem, 2) Planning strategy, 3) Executing the plan, and 4) Checking the answer.

METHODS

This research is Classroom Action Research (CAR). Activities in CAR study departs from the real problems faced by the teacher in the learning process, then reflected to alternative solutions to the problem and followed up with concrete actions planned and measured (Sutama, 2010: 134). It is important in the CAR is the action taken by the teacher to solve problems encountered in the teaching and learning process. If the program has not been able to solve the

problems that exist, it is necessary to do the next cycle (second cycle) to try other actions.

This research was conducted in MTA Gemolong Junior High School. Site selection was based on the background research schools that are still in the developmental stage and has never done research with the same title by the researcher.

This research was conducted in the months of April to September 2014 and the students of class VIII-A in MTA Gemolong Junior High School as the subject of acts receiver the number of students are 30 students who all were men and teachers of mathematics as a subject of action giver

The method used for data collection: 1) observations are used to obtain the direct understanding of student's mathematical problem solving abilities, 2) field notes are used to record important events that arise during the process of mathematics learning takes place, 3) documentation includes lesson plans, a list of names of students, teacher feedback sheet after each photo research and action, 4) test is used to obtain data on the extent to which the increased activity that refers to the indicator.

Data analysis techniques consist of: data analysis process, data presentation, and data verification. In the process of data analysis collected data and then perform data reduction includes selecting data based on relevance, compile the data, the data simplification and transformation of raw data from the field notes made in the implementation of each action. At the stage of presenting the data, the researchers collected information and then compiled the data coherently so easy to understand and can be inferred. The data verification is done in stages to obtain an accurate conclusion.

RESULTS AND DISCUSSION

Before implementation of measures, first the researchers provide an early test for the ability of the students to the material prerequisites. Further the study is applied to the Problem Based Learning model with Polya Strategy.

Phase 1, the orientation of students to the problem. In this step as an apperception the teacher asks previous material elements of the prism and pyramid by relating to the daily life. Teachers inform to the students about the goals of learning and motivate his students to actively engage in learning. Teachers spoke about the problems associated with the surface area and volume of prisms and pyramids.

Phase 2, organizing the students. In this step the teacher formed groups to solve a problem. Teachers encourage all students to actively engage in inquiry activities. Teachers monitor and evaluate the work of each group to maintain performance and group dynamics during learning by going around to each group.

Phase 3, guiding investigations of individuals and groups. In this step, the teacher encourages students to collect data about problems faced in order to truly understand the problem situation. Once enough data is collected, the students in the group began investigating the problems confronted the teacher, then the teacher encourages students to convey all his ideas and ask other students respond to the ideas presented.

Phase 4, after discussing and sharing their each idea, then develop and present the work by the Polya Strategy that steps are: 1) Understanding the problem, 2) Planning strategy, 3) Executing the plan, and 4) Checking. After discussion group completed the teacher calls a representative of one of the groups to present the results of their discussion. Another group of the presentation respond to the advanced group.

Phase 5, analyzing and evaluating the problem-solving process. After students present their work in front of the class, the teacher and other students together evaluating the problem-solving process then Teachers guide students to make the conclusion of the activities that have been carried out during the learning.

Learning that has been done thoroughly in cycle I and cycle II through the application of problem based learning model with Polya Strategy in mathematics

according to the indicators that have been used by researchers. The results of this study can be shown as follows:

Table 1

Result Data of Problem Solving Ability Improvment

Indicator	Percentage (Number of Students)		
	Prior Actions	Cycle I	Cycle II
Understanding the problem	30% (9 students)	73.33% (22 students)	96.67% (29 students)
Planning strategy	26.67% (8 students)	30% (9 students)	76.67% (23 students)
Executing plan	23.33% (7 students)	30% (9 students)	76.67% (23 students)
Checking the answer	0% (0 Students)	10% (3 Students)	56.67% (17 students)

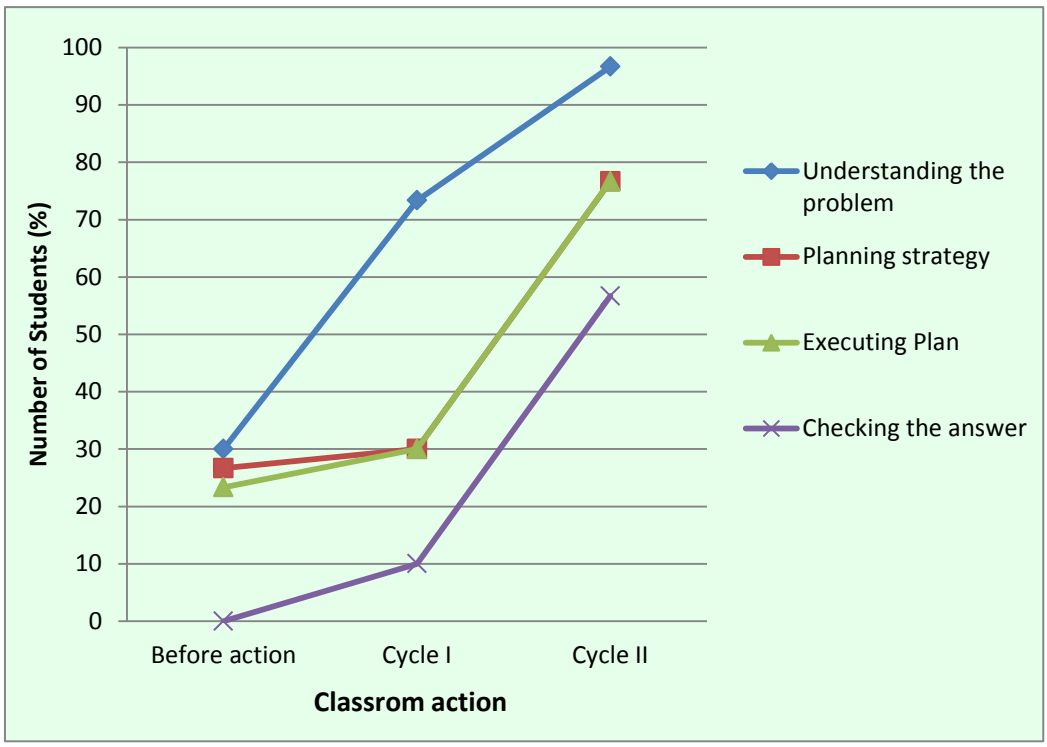
The table shows that in the first cycle occurred a significant increase in the 1st indicator that is understand the problem from 30% of students be 73.33% and has reached the target that researchers want, but the other indicators aren't yet to reach the desired target although has increase.

Research is continuing with the action on the second cycle and fourth of indicators has reached the desired target, that are: (1) Understanding the problem, before the action there are 9 students (30%), after the action increase to 29 students (96.67%); (2) Planning strategy, before the action there are 8 students (26.67%), after the action increase to 23 students (76.67%); (3) Executing the plan, before the action there are 7 students (23.33%), after the action increase to 23 students (76.67%); (4) Checking the answer, before action there is 0 students (0%), after the action increase to 17 students (56.67%).

The following data increased activity of students before and after the study in the form of graphs

Figure 1

Graph Of Problem Solving Ability Improvment



Overall after the implementation of the Problem Based Learning model with Polya Strategy can improve student's mathematical problem solving abilities of the first cycle to the second cycle. Improving student's mathematical problem solving ability can be clearly seen in the second cycle. At the act class in the second cycle, the teacher is able to properly condition the class, so students are more serious and focus during the teaching and learning activities. Students do not feel confused when applying Polya steps in working.

This study is in line with research that has been done by some previous researchers, one of which is the research conducted by Sudarman (2007) in the journal entitled, "Problem Based Learning: A Learning Model to Develop and improve the ability of problem solving", concluded that based learning problem was developed primarily to assist thinking skills, problem solving, and intellectual skills and learn to become autonomous learners.

This study is in line with research that has been conducted by Lina Marlina (2013) in his study entitled, "Application of Polya Step in Problem Solving Story Circumference and Area of rectangle", concluded that the application of Polya steps that can improve student learning outcomes in solving word problems circumference and wide rectangle in class VII A 19 Palu SMP is to understand the problem, make a plan, execute the plan, and look back at the complete solution.

This study is in line with research that has been done by Ali Muhson (2009) in his study entitled, "Increasing Student Interest in Learning and Understanding Through the Application of Problem Based Learning", the conclusion that: (a) Application of Problem Based Learning in advanced statistical learning capable increase student interest in learning both inside and interest in learning outside the classroom this happens because the learning process a lot more given the assignment of case analysis, either individually or in groups that require the participation of all students in the learning process. (b) Application of Problem Based Learning in advanced statistical learning can improve student understanding of the learning process due to more emphasis on the application of statistical techniques and procedures making it easier for students to understand the concept and its application.

In the David A. Jacobsen, et al (2009) explain that the steps of problem solving are identifying and clarifying the problem, planning the strategy, executing the strategy, and evaluating the results, it can be support the students to be a problem solver more systematic and analytic.

Based on that theory that support researcher, it can be conclude that implementation of Problem Based Learning model with Polya Strategy can improve mathematical problem solving abilities of students.

CONCLUSION

The application of the Problem Based Learning Model with Polya Strategy can improve student's mathematical problem solving ability. Based on the results of research conducted in collaboration between mathematics teachers of class VIII-A in MTA Gemolong Junior High School with researchers, the increase can be seen from the indicators observed in this study are:

1. Understanding the problem, before there is action 9 students (3 0%), after the action into 2 9 students (9 6.67%).
2. Planning strategy, no action before 8 students (26.67%), after the action to 23 students (76.67%).
3. Executing the plan, prior to action by 7 students (23, 33%), following action to 23 students (76.67%)
4. Checking the answer, before action is taken as 0 students (0%), after the action to 17 students (56, 67%)

REFERENCES

Amir, M.Taufiq. 2010. "Inovasi Pendidikan Melalui Problem Based Learning". Jakarta : Kencana.

David A. Jacobsen, dkk. 2009. "*Methods for Teaching*, Metode-metode Pengajaran, Meningkatkan Belajar Siswa TK – SMA". Yogyakarta: Pustaka belajar.

Utomo, Dwi Priyo. 2012. "Pembelajaran Lingkaran dengan Pendekatan Pemecahan Masalah Versi Polya pada Kelas VIII di SMP PGRI 01 DAU". Widya Warta, Number 01, XXXVI/ January 2012.

Sutama. 2010. "Penelitian Tindakan Teori dan Praktek dalam PTK, PTS, dan PTBK". Semarang: Surya Offset.

Marlina, Lina. 2013. “Penerapan Langkah Polya Dalam Menyelesaikan Soal Cerita Keliling dan Luas Persegipanjang”. Electronic Journal of Mathematics Education Tadulako, Volume 01, Number 01, September 2013: 43 – 52.

Muhson, Ali. 2009. “Peningkatan Minat Belajar dan Pemahaman Mahasiswa Melalui Penerapan Problem-Based Learning”. Journal of Education Volume 39, Number 2, November 2009: 171-182.